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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/810,454	03/19/2001	Eiji Hayashi	50088-056	7197

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McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

JOHNSON, JONATHAN J

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 05/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/810,454

Applicant(s)

HAYASHI

Examiner

Jonathan Johnson

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taizo (JP 11-097493) in view of Ulmer (6,138,894) and Kuriyama (5,315,474). Taizo teaches applying a vacuum to the end of a semiconductor element through an ultrasonic bonding head to fixedly attach the semiconductor element to the ultrasonic bonding head (Figure 1, item 14, 5, and 2); applying a pressure to gold bumps to connect the pad of a semiconductor element or a connecting pad of the wiring board for connecting the bumps under a state that the bumps are in contact while the ultrasonic bonding head is moved in a plurality of directions (Translation sections 14-17 and Figure 2, Items a and b). Ulmer teaches heating solder bumps minimally sufficient to melt the solder at a temperature "about the melting temperature of the solder." (Column 2, Lines 40-45; Column 4, Lines 34-35 and Figure 3, Item 50). Kuriyama teaches an inactive atmosphere or a reducing atmosphere is formed during bonding (Column 5, Lines 15-45). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Taizo to utilize a heater to heat the solder bumps to more than the fusing point of the solder in order to ensure the die is bonded to the substrate and to shorten the manufacturing time (see Ulmer Column 4, lines 35-41) and further to modify the combined

invention of Ulmer and Taizo to utilize the particular gas of Kuriyama in order to prevent oxidation of the bonding surfaces.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taizo (JP 11-097493) in view of Ulmer (6,138,894) and Uno (JP 6-29357). Taizo teaches applying a vacuum to the end of a semiconductor element through an ultrasonic bonding head to fixedly attach the semiconductor element to the ultrasonic bonding head (Figure 1, item 14, 5, and 2); applying a pressure to gold bumps to connect the pad of a semiconductor element or a connecting pad of the wiring board for connecting the bumps under a state that the bumps are in contact while the ultrasonic bonding head is moved in a plurality of directions (Translation sections 14-17 and Figure 2, Items a and b). Ulmer teaches heating solder bumps minimally sufficient to melt the solder at a temperature "about the melting temperature of the solder." (Column 2, Lines 40-45; Column 4, Lines 34-35 and Figure 3, Item 50). Uno teaches ultrasonic bonding by moving the head along a circular locus (abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Taizo to utilize a heater to heat the solder bumps to more than the fusing point of the solder in order to ensure the die is bonded to the substrate and to shorten the manufacturing time (see Ulmer Column 4, lines 35-41) and further to modify the combined invention of Taizo and Ulmer to utilize moving the head along a circular locus in order to shorten the metal bonding time (see Uno abstract).

Response to Arguments

Applicant argues that Ulmer and Taizo cannot be combined with Kuriyama because Kuriyama is directed towards connecting fuse wires, not flip chip bonding. The examiner disagrees. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). In the instant case, it is the examiner's position that, when reading Kuriyama as a whole, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Ulmer and Taizo to utilize the particular gas of Kuriyama in order to prevent oxidation of the bonding surfaces (see Kuriyama Column 5, Lines 15-45). Although it is true that Kuriyama deals with fusing wires and not flip chip bonding, it is the examiner's position that this is a distinction without a real difference. Kuriyama, Ulmer, and Taizo all deal with semiconductor manufacturing, in particular all three prior art references deal with techniques to ultrasonically bond leads to pads. Kuriyama teaches using a particular gas to prevent oxidation of the bonding surfaces during ultrasonic bonding. The examiner finds this is strong motivation to find an expectation from the prior art that the claimed invention will have the same or a similar utility as applicant's invention.

Applicant next argues that Taizo does not teach the bonding head is moved along a circular locus. The examiner disagrees. Taizo teaches that the bump was deformed in an approximate circle form (translation section 18). Although the vibrations of Taizo occurs in both horizontal and vertical zig-zag directions (Figure 2, items a and b), it is the examiner's position that the vibrations must have occurred within the locus of a circle because the circular

deformation of the bump. The examiner would like to note that Webster's dictionary defines locus as a center of activity, attention, or concentration.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Johnson whose telephone number is 703-308-0667. The examiner can normally be reached on M-Th 7AM-5:30 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on 703-308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.

jj 
May 22, 2003


TOM DUNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700